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Oncoplastic breast surgery techniques - a new look at surgical treatment of breast cancer

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ABSTRACT

Breast cancer is the most common cancer among Polish women [1], thus, the problem of surgical treatment of breasts, especially with regard to conserving and/or reconstruction surgery, is extensively discussed. Currently, in Poland, efforts are made to increase the number of oncologic and reconstructive breast centers which offer specialized treatment of this cancer, the so-called 'Breast Units' [1]. This paper analyzes methods of reconstructions, discusses the techniques used in particular types of surgeries and additionally informs the reader of the oncological aspects of the procedures. Based on literature, statistical data of breast reconstructions from Poland and the world are presented. Moreover, complications and psychological aspects of mammary gland surgery are dealt with, and the aesthetic effects of breast reconstructions are discussed. To support of our findings, we also present selected clinical cases from the oncological and reconstructive point of view.

INTRODUCTION

Breast cancer is the most common cancer in women [1]. Indeed, recent data show that there are nearly 18,500 new cases every year in Poland, and that the annual mortality rate due to breast cancer is 6,000. Moreover, over 60,000 patients who were diagnosed with breast cancer are currently at various stages of oncological treatment. Of note, the 5-year survival rate in Poland is around 82% [2].

Statistical research has shown that diagnosis and treatment of breast cancer in specialized Breast Surgery Departments, the so-called 'Breast Units', has a significant influence on the decrease of mortality rate. Of importance, the surgical treatment performed in Breast Units enables immediate and delayed breast reconstructions [1]. These types of procedures make it possible to rebuild a symmetrical, natural-looking breast while maintaining oncologic safety [3-8]. Such type of cancer treatment improves the quality of life of patients [9]. Reconstructive surgery is, hence, an integral element of the modern treatment for breast cancer in women, and, at the initial stage of breast cancer diagnostics, patients should be informed about the possibility of breast reconstruction. This is especially so nowadays when we have more and more effective reconstructive techniques at our disposal.

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MATERIAL USED IN BREAST RECONSTRUCTION

When discussing currently available breast reconstructive methods, the use of Becker expander prosthesis should be the first enumerated. In this method, the expander is simultaneously an implant [10]. The expander prosthesis consists of an outer gel layer and an inner one which forms a reservoir with a port for filling with saline solution [11]. The implantation of this type of prosthesis enables the performance of a one-stage operation, without having to exchange the expander for the implant. However, the method has a number of disadvantages. The reconstructed breast is hard and looks artificial. Furthermore, due to the one-stage treatment, it is impossible to correct the position and shape of the breast later. There have also been some cases of port leakage described [11]. Currently, this type of technique is less frequently used.

The most common method of delayed breast reconstruction is the two-stage expander - implant technique. In the first stage, the expander, filled with a small amount of physiological saline, is placed under the pectoralis major muscle [12]. Its use is to extend tissues due to its gradual filling with physiological saline through an integrated valve marked with a magnetic ring [13]. The modern design of the expander enables post-operative carers to find the port quickly (minimizing the risk of damage to the expander when filling) and to avoid additional infectious complications. After having expanded the tissues sufficiently, in the second stage of the operation, the expander is replaced by an implant. The advantage is to obtain a slightly larger expansion of the tissues, making the skin less tense, and consequently enabling a more natural look of the reconstructed breast [14].

Currently used implants are the fifth generation of prostheses introduced originally in 1960. The improved structure is fully safe due to the use of a silicone gel with a very coherent consistency, a so-called "cohesive gel" [15]. Owing to this, the risk of leakage of the prosthesis and the possibility of silicone leakage into the tissues have been eliminated. The implants available today have different shapes (anatomical and round), sizes (height, width, projection) and types of surface (textured and smooth) which guarantees a very individual choice of prosthesis for each woman. Implants with texture are help to prevent migration and early capsular contracture and help to develop a well-defined inframammary fold and ptosis. Silicone gel implants are traditionally thought to provide a softer, more natural feeling breast compared with saline implants.

Types of breast reconstruction

There are several factors which influence the decision about the form of reconstruction to be performed: the clinical stage of the cancer, the type of planned adjuvant treatment, the patient's past medical history, addictions, patient's preferences [16]. There are two types of breast reconstructions: delayed and immediate reconstruction. Delayed reconstruction can be carried out in one or in two stages. The one-stage operation can be performed using the Becker prosthesis or using patient's own tissues. In contrast, the two-stage reconstruction consists in using the expander in the first stage and replacing it with the implant in the second stage. Combined methods are also used [17].

Immediate breast reconstruction is a procedure used following radical mastectomy and performed during a single operation. Immediate breast reconstruction can be carried out in one or two stages. Immediate one-stage reconstruction consists in removing the breast and reconstructing it in one operation. Delayed immediate breast reconstruction includes breast removal and simultaneous application of the expander. Placement of the implant is carried out after having completed oncological treatment and/or after tissues have been expanded [10,13,16].

Oncological procedures

The oncological part of the procedure, which precedes reconstructive procedures, also includes: sentinel lymph node biopsy (SLNB) [18], intraoperative histopathological examination of the sentinel lymph node (SLN), possible lymphadenectomy in the case of metastases to SLN.

The sub-nipple area is prepared with high accuracy, and the tissue material from this area is separately collected and subjected to histopathological examination. In women who show the presence of neoplastic malignancy in the paraffin examination, the nipple is removed [19,20].

Surgery techniques

The most frequently performed oncological and reconstructive surgery is subcutaneous nipple-areola sparing mastectomy i.e. preserving nipple complex and simultaneous breast reconstruction with implant [21]. Technically, the treatment begins with an incision, the so-called 'crazy S' in the breast upper outer quadrant. From this area, the skin is carefully prepared along the Cooper's ligaments, removing the whole of the breast gland together with the fascia of the pectoralis major muscle. It is very important to maintain oncological radicality and focus on atraumatic preparation of subcutaneous tissue and skin to avoid ischemic complications. Accurate hemostasis protects against infectious complications and the need to re-examine the wound. Tissue preparation is then performed in the next area, i.e. under the pectoralis major muscle. The implant is subsequently inserted into the created cavity. The pectoralis major muscle is also injected with local anesthetic, which significantly reduces pain in the early postoperative period. The cavity is closed with single sutures or mesh [22], and the space is drained. Finally, the skin is sutured with an absorbable thread (monosine) with a continuous seam.

Breast reconstruction in the world *vs.* in Poland

According to current worldwide literature data, a notable increase of immediate breast reconstruction (IBR) is observed. In the United States, since 2008, there has been a significant increase in reconstructive surgery using implants [23]. American data shows that currently over 70% of reconstructions are performed in conjunction with mastectomy [24]. In Europe, an increase in immediate breast reconstructions is also observed. The British data show an increase in immediate reconstruction over the period 2007-2014 from 38% to 54% [25]. Recently, Kołacińska *et al*. collected the statistics of breast reconstructions from 18 polish breast surgeries departments [26]. Depending on the center, immediate breast reconstruction reaches up to 42% of the total. Accordingly, the most frequent type of IBR was either a two-stage expander followed by a permanent implant or one-stage implant- with or without synthetic mesh. Moreover, the most frequent type of delayed breast reconstruction (DBR) was a two- stage expander followed by implant-based reconstruction [26]. On analyzing the statistical data of the national health fund, there is also an increase in procedures using the implant [27].

The increase of immediate reconstruction vs. delayed is also confirmed by the data of the Breast Surgery Department of the Cardinal Stefan Wyszynski Regional Specialist Hospital in Lublin.

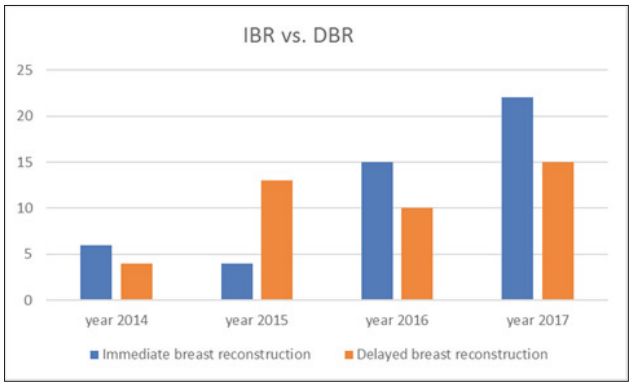

Figure 1. Numbers of immediate and delayed breast reconstruction performed in the Breast Surgery Department of Cardinal Stefan Wyszynski Specialist Hospital in Lublin (own material)

Complications

According to current literature data, the numbers of complications after reconstructive procedures with implants and expanders in Poland constituted about 3-6%. The most commonly observed complications are hematoma, infection, seroma, implant loss, extrusion, transposition [26]. Worldwide studies comparing the number of complications between immediate and delayed reconstructions shows different results [28]. Yoon *et al*. reported that within a two year postoperative period, immediate reconstruction has more complications than delayed [29]. Other authors also confirm the occurrence of more complications after immediate reconstruction. Among these are necrosis, delayed wound healing, infection and tissue fibrosis [30]. There are also reports of the lack of significant differences between immediate and delayed reconstruction [31].

It should be noted that many complications arise from postoperative adjuvant radiotherapy. Delayed reconstruction can, hence, be offered to women who are likely to undergo radiotherapy. Many authors claim that in case of radiotherapy, the delayed two stage breast reconstruction is more safe [32,33]. However delayed reconstruction after radiotherapy treatment can be much more technically difficult, thus resulting in a poorer cosmetic result and leaves the patient without a breast for sometime [34]. The problem of irradiation after mastectomy is extensively discussed

Psychological aspect

Most women who have undergone reconstruction after mastectomy are satisfied with effects of the surgery. The most common answers for the question as to what the reconstruction changes in their life meant were: improvement of well-being, recovery of appearance and increased self-confidence [35]. Research has shown that patients who had breast reconstruction recall less psychological distress than those who underwent simple mastectomy without reconstruction [36]. Al-Ghazal et al. revealed that most patients who had immediate reconstruction stated that they would still prefer immediate reconstruction, while patients who had delayed reconstruction would have preferred immediate reconstruction [37]. Other studies have shown that patients who underwent immediate reconstruction demonstrated the beneficial impact of psychosocial well-being, physical well-being, sexual functioning and body image before and after immediate reconstruction, as compared with patients who received delayed reconstruction. After two years, however, the level of satisfaction and well-being was the same after immediate and delayed breast reconstruction [24].

SUMMARY

Each year, an increase of breast cancer morbidity is observed. Early diagnosis and treatment of breast cancer provided by specialized Breast Surgery Departments has, however, had a statistically significant influence on the decrease in mortality caused by this cancer.

At the moment, there is an aspiration to organize an increasing number of oncology and reconstruction centers dealing with specialized treatment of breast cancer – the so-called 'Breast Units'. Herein, oncoplastic surgery is an interdisciplinary field based on cooperation between oncological surgeons, plastic surgeons, clinical oncologists, pathomorphologists, radiologists and psychologists.

In the presented material, an increase in immediate breast reconstruction is noticed. As made evident in the study, immediate breast reconstructions provide much better aesthetic effect than delayed breast reconstructions. Advancement of reconstructive techniques and their greater accessibility in Poland, has significantly changed the types of reconstructive breast surgeries available nowadays.

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